

## MAL-ISO50/10/5/1

### Isolation amplifiers

#### Perfectly conditioned. Isolated.

Voltage and current signals (MAL-ISO1) can optimally be adjusted to the input of a data acquisition system with the differential amplifiers MAL-ISO50/10/5/1. The isolation of the analog inputs guarantees reliable measurement results.

#### Minimum size.

#### Great performance. Small price.

The miniature format of the MAL-ISO50/10/5/1 is ideal to realize measurement applications even if the installation is in problematic locations. Despite the small size, the measuring amplifier features great functionality. All this at a reasonable price.

#### Clearly safe.

The galvanic isolation provided by the isolation amplifiers guarantees interference-free operation and protects the DAQ system and the PC against high potentials.

$\pm 50V$ ,  $\pm 10V$ ,  $\pm 5V$ ,  $\pm 1V$  in.

$\pm 5V$  out.

The amplifier types differ in their input voltage range of  $\pm 1V$  up to  $\pm 50V$ . A  $\pm 5V$  signal proportional to the input signal is provided at the output.



#### MAL-ISO1: Voltage and current.

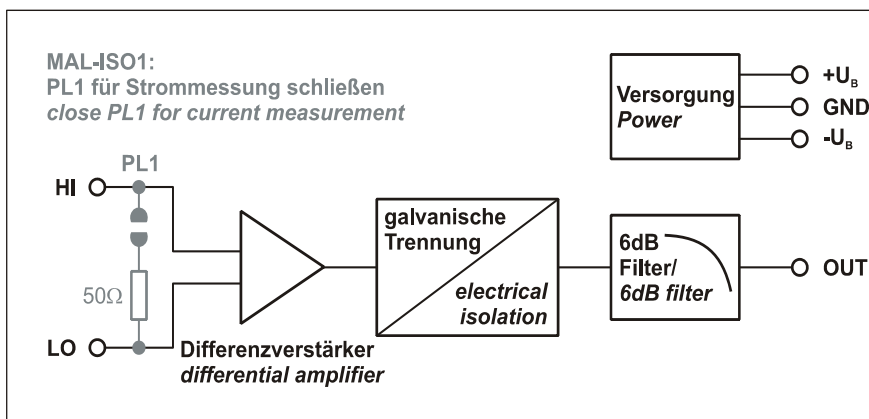
In addition to signal conditioning of  $\pm 1V$  voltages, the MAL-ISO1 can be used for current measurement in the  $\pm 20mA$  range. Changing the operating mode is done via a soldering bridge on the bottom side of the board.

#### Compatibility.

The MAL series provides a great variety of measuring amplifiers, measuring converters, or filter modules. They can be used in any combination allowing for the solution of the most individual measuring tasks.

#### Get connected.

With the backplanes of the BP series varying in size and design, signal connection is easy. The modules just have to be plugged on the relevant slot of the backplane.



Functional diagram

## 1 Available versions

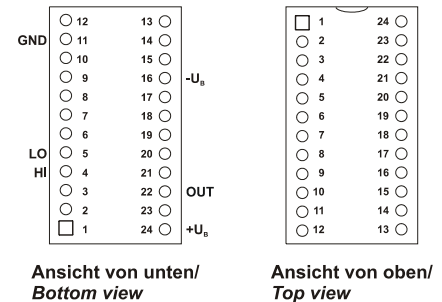
Product	Physical quantity	Measuring range
MAL-ISO50	voltage	$\pm 50V$
MAL-ISO10	voltage	$\pm 10V$
MAL-ISO5	voltage	$\pm 5V$
MAL-ISO1	voltage or current	$\pm 1V$ (factory setting) or 20mA

## 2 Installation

The measuring amplifier is plugged onto a 24-pin socket. If the marking of the socket is on the left, pin 1 is bottom left.



**Check for correct poling. Change modules only at no load!**



## 3 Pin assignment

The pin assignment of the modules is illustrated in the figure above and in the following table.

Pin	Name	Function
1, 2, 3	n. c.	-
4	+IN	HI signal input
5	-IN	LO signal input
6, 7, 8, 9, 10	n. c.	-
11	GND	ground
12	n. c.	-

Pin	Name	Function
13, 14, 15	n. c.	-
16	$-U_B$	supply $-7.5V..-15V$
17, 18, 19, 20, 21	n. c.	-
22	OUT	amplifier output $\pm 5V$
23	n. c.	
24	$+U_B$	supply $+7.5V..+15V$

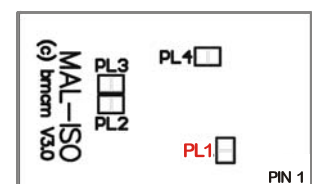
## 4 MAL-ISO1: Voltage or current

The MAL-ISO1 can process both voltage and current signals. Changing the operating mode is done by changing the configuration of the solder jumper PL1. Default setting of the MAL-ISO1 is voltage measurement.



**All other jumpers are for internal use only and must not be changed!**

Jumper	Function
PL1 open	voltage $\pm 1V$ (factory setting)
PL1 close	current 20mA
PL2, PL3, PL4	internal



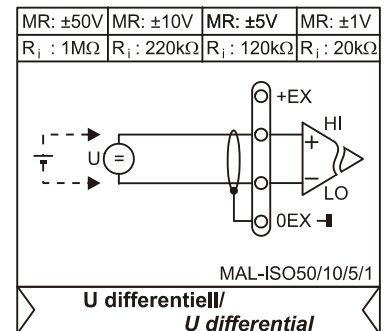
## 5 Interfacing examples

The module output is proportional to the input voltage in all operating modes and ranges. Apply cable shield at one end only. If earthing is required, connect the screen only at one end, otherwise there is a risk of hum pick-up.

### 5.1 Voltage measurement (DC)

DC voltages within the allowed input range are provided electrically isolated at the output as a  $\pm 5V$  signal to be connected to a PC data acquisition system.

- MAL-ISO50:  $\pm 50V$  (input)  $\approx \pm 5V$  (output)
- MAL-ISO10:  $\pm 10V$  (input)  $\approx \pm 5V$  (output)
- MAL-ISO5:  $\pm 5V$  (input)  $\approx \pm 5V$  (output)
- MAL-ISO1 (PL1 open):  $\pm 1V$  (input)  $\approx \pm 5V$  (output)

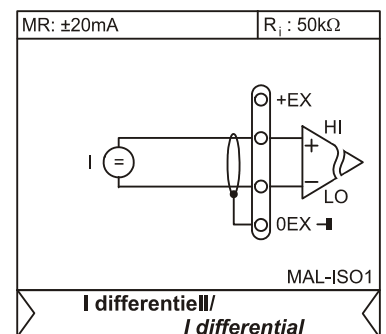


### 5.2 Current measurement (MAL-ISO1)

For current measurement with MAL-ISO1 a  $50\Omega$  shunt is activated (PL1 closed). The measurement is done in the  $\pm 1V$  measuring range.



**Do not connect any power sources as otherwise the shunt might be overloaded!**



## 6 Other MAL amplifiers and connection technology (BP series)



A great variety of miniature measuring amplifiers with or without galvanic isolation is available. The backplanes of the BP series from bmcM differ in size and design allow the comfortable connection to the data acquisition system and for the sensor supply. The MAL measuring converters can be plugged on the backplanes in any combination.

The following MAL modules and BP backplanes from bmc are available:

Product	Description
MAL-FU	Frequency-voltage converter in miniature format
MAL-PT100	Miniature amplifier for temperature (PT100, 0..300°C)
MAL-R1K	Miniature amplifier for resistance (0..1kΩ)
MAL-SEIKA	Miniature amplifier for SEIKA sensors ( $\pm 0.5V$ measuring range, 2.5V offset)
MAL-SG2/5	Miniature amplifier for strain gauge ( $\pm 2mV/V$ or $\pm 5mV/V$ )
MAL-THR	Miniature amplifier for temperature (thermocouple, type K, 0..1250°C)
MAL-UI	Miniature amplifier for voltage ( $\pm 1V/\pm 5V/\pm 10V/\pm 50V$ ) and current ( $\pm 20mA$ ), 5V sensor supply
BP16	16 slots, external device in aluminum housing, 5V sensor supply, connections: 2x Sub-D37
BP2	2 slots, for DIN rail mounting, 5V sensor supply, connections: screw terminals
BP2-BOX	2 slots, external device in IP65 box, 5V sensor supply, connections: screw terminals

## 7 Important notes for using the MAL-ISO50/10/5/1

- The MAL-ISO50/10/5/1 is only suitable for extra-low voltages - please observe the relevant regulations!
- Only use an electrical isolated power supply unit (with CE).
- Turn off the power before mounting the module onto the carrier board.
- All accessible pins are electrostatic sensitive devices. Provide for a grounded conductive work place.
- MAL-ISO50/10/5/1 must only be operated in closed housings (for reasons relating to EMC).
- Only use non-solvent detergents for cleaning. The product is designed to be maintenance-free.
- The module must not be used for safety-relevant tasks. With the use of the product, the customer becomes manufacturer by law and is therefore fully responsible for the proper installation and use of the product. In the case of improper use and/or unauthorized interference, our warranty ceases and any warranty claim is excluded.



Do not dispose of the product in the domestic waste or at any waste collection places. It has to be either duly disposed according to the WEEE directive or can be returned to bmc at your own expense.

## 8 Technical data

(typical at 20°C, after 5min., +7.5V supply)

### • Input range

Measuring range DC:

Input resistance:

Bandwidth:

Input suppressor circuit for 1sec.:

MAL-ISO50	MAL-ISO10	MAL-ISO5	MAL-ISO1	
$\pm 50V$	$\pm 10V$	$\pm 5V$	$\pm 1V$ (PL1 open, ex works)	$\pm 20mA$ (PL1 closed)
1MΩ	220kΩ	120kΩ	20kΩ	50Ω
50Hz				
max. 200V (not in case of current measurement)				

### • Output range

Output voltage:

Output load:

Amplifier accuracy // Temperature drift:

Output interference or output ripple :

Current supply sensitivity:

Output filter // Filter cut-off frequency  $f_g$ :

$\pm 5V$
$> 1k\Omega$ ; recommended for higher accuracy: $> 10k\Omega$
typ. 0.1%; max: 0.2% // 50ppm/°C
typ. 5mV <sub>ss</sub> at app. 100kHz (e.g. from DC/DC converter of the backplane)
typ. $\pm 10mV/V$
1-pole (6dB/oct.) // app. 160Hz

The values for accuracy always relate to the respective measuring range. Errors might add at worst.

### • General

Power supply // Current consumption:

CE standards:

ElektroG // ear registration:

Max. permissible potentials:

Dimensions // Protection type:

Temperature ranges:

Relative humidity:

Delivery:

Available accessories:

Warranty:

$\pm 7.5V$ DC .. $\pm 15V$ DC // app. 6mA .. 10mA
EN61000-6-1, EN61000-6-3, EN61010-1; for decl. of conformity (PDF) visit <a href="http://www.bmc.de">www.bmc.de</a>
RoHS and WEEE compliant // WEEE Reg.-No. DE75472248
<b>60V DC acc. to VDE</b> , max. 1kV ESD on open lines
plastic housing 33mm x 20mm x 15mm // IP30
operating temp.: $-25^\circ C$ .. $+50^\circ C$ , storage temp.: $-25^\circ C$ .. $+70^\circ C$
0-90% (not condensing)
product, description
module backplanes: BP16, BP16-PC, BP2, BP2-BOX
2 years from date of purchase at bmc, claims for damages resulting from improper use excluded